REMARKS

Examiner Pompey is to be thanked for careful review of the pending application.

Favorable reconsideration of this application in light of the above amendments and the following remarks is respectfully requested.

Claims 1, 3-6, and 8-10 remain in this application. Claim 1 is twice amended and claim 6 is thrice amended herein. No claims have been allowed.

Claim Rejections - 35 U.S.C. § 112

2. The Examiner has previously rejected Claims 1-10 under 35 U.S.C §112, first paragraph, because the specification does not enable a person skilled in the art to which it pertains to make the invention commensurate in scope with the claims; namely, there appear to be two oxidation temperatures in the specification , but only one oxidation temperature is cited in the claims. Applicant had acknowledged the Examiner's argument and had amended applicant's claims 1 and 6 to attempt to satisfy the argument of the Examiner. The Examiner has replied that the amendments do not overcome his original rejection under 35 U.S.C. 112, first paragraph, of applicant's amended claims 1 and 6.

Applicant acknowledges in general the argument of the Examiner that applicant's invention as claimed in applicant's amended base claims 1 and 6 are not in complete agreement with applicant's invention as disclosed in applicant's specification particularly on p. 9.

In response, applicant has twice amended claim 1 and thrice amended claim 6 to show more clearly that there are two oxidation temperature regimes in applicant's invention.

In light of the foregoing response, applicant respectfully requests that the Examiner's rejections of Claims 1-10 under 35 U.S.C. § 112, first paragraph, as failing to enable a person skilled in the art pertinent to the invention to make the invention commensurate in scope with the claims, be withdrawn

Discussion

With respect to the Examiner's citation, applicant respectfully submits that formation of a silicon oxide dielectric layer with beneficial effects such as control of the rate of oxidation and formation of silicon oxide with desired properties, may be accomplished simultaneous with minimization of deleterious formation of impurities related to out-diffusion of nitrogen species from adjacent silicon nitride layers, when the oxidation is carried out at a temperature greater than at least 1100 degrees centigrade. In this temperature region, the formation rate of silicon oxide and the thermodynamic stability of silicon oxide compared to silicon nitride are both sufficiently great to allow formation of relatively thick layers of silicon oxide while minimizing any likelyhood of nitrogen out-diffusion and silicon nitride or oxynitride formation.

The significant limitation of thermally oxidizing at a temperature greater than at least about 1100 degrees centigrade to minimize nitrogen out-diffusion, as specified in applicant's twice amended claim 1 and thrice amended claim 6, is therefore an essential part of applicant's invention.

Applicant further respectfully submits that applicant's invention further allows additional thickness of silicon oxide dielectric layers if desired, by additional thermal oxidation carried out at a temperature no greater than 1100 degrees. This is consistent with applicant's desire to maintain a silicon oxide dielectric layer free of any inclusion of silicon nitride or other foreign species. This intent of exclusion of species, other than silicon oxide, is clearly more likely of attainment if the further oxidation temperature is kept below that of the original formation of silicon oxide, which was already selected as desired to form silicon oxide at a rate faster than the diffusion of undesired species such as nitrogen.

Other Considerations

No fee is due as a result of this amendment.

SUMMARY

Applicant's invention, as claimed within twice amended Claim 1 and thrice amended Claim 6 and Claims 3-5 and 8-10, is directed toward a method for forming within a silicon semiconductor substrate employed within a microelectronics fabrication a silicon oxide dielectric layer employed as a field oxide (FOX) isolation layer by local dry thermal oxidation of the silicon substrate. Thermal oxidation of the silicon oxide substrate is first carried out at a temperature high enough to allow formation of a silicon oxide dielectric layer free of impurity inclusions, and then at a lower temperature if a thicker silicon oxide layer is desired while still excluding foreign impurities. In conjunction with applicant's claims 1 and 6 as amended, the prior art of record employed in rejection of applicant's claims to applicant's invention neither claims singly nor in combination each and every limitation within applicants twice amended base claim 1 and thrice amended base claim 6, or in the original dependent claims 3-5 and 8-10.

CONCLUSION

On the basis of the above amendments and remarks, reconsideration of this application, and its early allowance, is respectfully requested.

Any inquiries relating to this or earlier communications pertaining to this application may be directed to the undersigned attorney at 845-452-5863 or Mr. George Saile, Esq. (Reg. No. 19,572) at 845-452-5863, at the Examiner's convenience.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims

Claims 1 and 6 are amended as follows:

1. (TWICE AMENDED) A method for forming within a silicon semiconductor substrate employed within a microelectronics fabrication a silicon oxide dielectric layer comprising:

providing a silicon semiconductor substrate;

forming over the silicon semiconductor substrate a patterned silicon nitride mask layer;

oxidizing the silicon semiconductor substrate locally at a first oxidation temperature of at least above 1100 degrees centigrade through the silicon nitride mask pattern to form silicon oxide dielectric layers to prevent out-diffusion of nitrogen species and minimize formation of silicon oxynitride inclusions within the silicon oxide layers [.]; and

oxidizing the silicon substrate further at a second temperature no greater than 1100 degrees centigrade, as desired to form greater thickness of said silicon oxide dielectric layers.

6. (THRICE AMENDED) A method for forming within a silicon semiconductor substrate employed within an integrated circuit microelectronics fabrication a silicon oxide dielectric field oxide (FOX) isolation layer comprising:

providing a silicon semiconductor substrate;

forming upon the silicon semiconductor substrate a silicon oxide pad oxide layer;

forming upon the silicon oxide pad oxide layer a patterned silicon nitride mask layer; [and]

oxidizing the silicon substrate locally at a first oxidation temperature of at least above 1100 degrees centigrade through the patterned silicon nitride mask layer to form silicon oxide dielectric field oxide (FOX) isolation layers to prevent out-diffusion of nitrogen species and minimize formation of silicon oxynitride inclusions within the silicon oxide dielectric layers; [.] and

oxidizing the silicon substrate further at a second temperature no greater than 1100 degrees centigrade, as desired to form greater thickness of said silicon oxide dielectric layers.